

**REPORT: FIELD INSPECTION OF
PROWSE MEMORIAL BRIDGE
BRIDGE 140/120
LONDONDERRY, NEW HAMPSHIRE
JUNE 26, 2014**

ARCHITECTURAL HISTORY HISTORIC PRESERVATION

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The following persons met at the Prowse Memorial Bridge (140/120) on June 26, 2014 to discuss the feasibility of disassembling the bridge with care, to permit its reassembly at some other location yet to be determined: G. Keith Donington, P. E., vice president and senior supervising structural engineer, Parsons Brinckerhoff; Adam M. Stockin, P. E., senior structural engineer, Parsons Brinckerhoff; and James L. Garvin, preservation consultant.

On the basis of an individual inventory form prepared in 2002, Prowse Memorial Bridge (1962) was determined eligible for listing in the National Register of Historic Places by the New Hampshire Division of Historical Resources at meetings on February 27, 2002, and January 22, 2003. Because the bridge had not yet attained the age of fifty years in 2002, it was evaluated under National Register Criteria Consideration G, which deals with properties that have attained significance within the past fifty years and are of exceptional importance. The finding of eligibility on January 22, 2003, stated that

In December, 2002, the Prowse Memorial Bridge was evaluated under National Register Criteria Consideration G. This evaluation determined that, although it is less than fifty years old, the bridge possesses exceptional significance as an engineering structure and is eligible for the National Register. The designer of the bridge was Robert J. Prowse (1906-1969), an award-winning pioneer in welded steel bridge design who also taught engineering courses and published articles on various aspects of steel bridge design. The bridge was recognized as an outstanding and experimental structure from its conception. As a design, it was awarded a coveted prize by the American Bridge division of United States Steel. As a newly-built standing structure, the bridge was recognized for its beauty through an award from the American Institute of Steel Construction. The bridge was one of the first examples of all-welded bridge design in New Hampshire and was the first known example of a steel rigid frame bridge on the United States Interstate or Primary road systems. The bridge embodies sophisticated structural analysis of a type not previously required or employed on a New Hampshire bridge. This analysis made use of complex mathematical formulas and of testing

techniques that were so advanced that the New Hampshire Department of Public Works and Highways did not own the requisite testing apparatus.

As a result of this finding, Prowse Memorial Bridge was identified as one of two New Hampshire resources in the Interstate System that remain subject to Section 106 and 4(f) reviews when federal authorities exempted all but exceptional resources on the Interstate System from these reviews in 2006. The exemption statement reads,

The Robert Prowse Bridge achieves exceptional significance under Criterion Consideration G for its innovative engineering design by NHDOT's nationally recognized engineer, Robert Prowse. Its steel rigid frame is composed of five frames or bents designed to function as a series of parallel two-hinged rigid frames. Its design utilizes steel cutting and innovative welding technology to create each frame as a sculptural shape reflecting its internal stresses and to bring together a few large structural elements. The bridge reflects the post-World War II initiative for highway bridge designers to produce connections through welding rather than riveting technology. This technology was rapidly adopted for the production of long bridge stringers, permitting the construction of continuous stringer bridges rather than utilizing built-up plate girders. Prowse verified assumptions and complex calculations by using the Beggs deformer to test models of his structure. The bridge was the first known example of all-welded steel rigid frame technology used along the Interstate Highway System or on primary road systems in the U.S.

A memorandum of agreement (MOA) for the future treatment of the Prowse Memorial Bridge, executed in February 2004, recognized this exceptional significance. The MOA included the following stipulations:

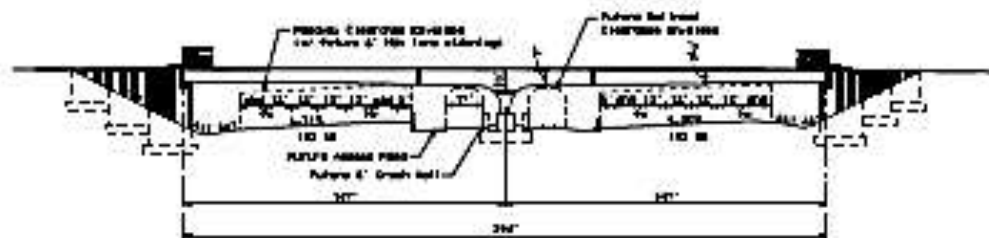
NHDOT shall record the bridge according to the standards of state-level Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) documentation agreed to by FHWA and NHSHPO. Such documentation shall include large format photography, design plans, and a detailed narrative documenting the property's history and significance. NHDOT shall ensure that all documentation is completed and accepted by NHSHPO and FHWA prior to any disturbance of the property and that copies of this documentation are made available to NHSHPO and appropriate local archives designated by the NHSHPO.

The MOA recorded the fact that “NHDOT has evaluated design alternatives to avoid impacts to the Robert Prowse Bridge. They include extending the bridge by splicing new girders onto the eastern end of the bridge, thus developing an additional span to cross over the proposed northbound lanes; and reusing the bridge at its present location to accommodate either the proposed northbound or southbound barrel of I-93, by shifting the proposed alignment to either the east or west. These alternatives did not meet the engineering and safety standards necessary for this section of I-93. They introduce additional environmental impacts and result in substantial right-of-way impacts, including impacts to the Woodmont Orchard Historic District [to the west].”

As proposed mitigation under these circumstances, the MOA stipulated the following actions:

- The Prowse Bridge will undergo HAER documentation as specified above.
- NHDOT shall replace the bridge with a steel rigid frame structure of compatible design, assuming such a design is reasonable and practicable in terms of cost, subsurface foundation materials, the profile of Pillsbury Road/Ash Street, and other elements of design yet to be developed.
- NHDOT shall make a concerted effort to find an adaptive reuse for the bridge prior to construction of the associated element of the Salem-Manchester project. The feasibility of reuse will be determined through cost benefit analysis and structural analysis. If feasible, it will move the bridge to a new location.
- If the Department or other state agencies do not identify a use for the bridge, the NHDOT will advertise the bridge for reuse by others in New Hampshire. The NHDOT will initiate steps to market the bridge in accordance with Section 144(a) of Title 23, U.S.C., which as created by Public Law 100-17 (Surface Transportation and Uniform Relocation Assistance Act [STURAA] of 1987). . . . The bridge's plaque will remain with it unless an adaptive use cannot be found[,] in which case it will either be placed in the exhibit described in [the] stipulation [below] or exhibited in the NHDOT lobby.
- The Department will place an interpretive exhibit about its design and fabrication at the Salem Rest Area. NHSHPD will review and approve the exhibit's content.

In 2006, NHDOT proposed several possible variations of the “steel rigid frame structure of compatible design” specified above as one component of mitigation. According to Parsons-Brinckerhoff representatives Keith Donington and Adam Stockin, the engineering firm has pursued one of these suggested configurations (shown below from the 2006 draft) to the level of 80% design development:



ALTERNATE #1 (E&T, \$2.84M)
TWO-SPAN
SCALE: 1"=50'-0"

This concept has reportedly been accepted in principle by the New Hampshire Division of Historical Resources (NHSHPD).

According to reports made at a project meeting (which was not a regularly scheduled cultural resources meeting) at the New Hampshire Department of Transportation on February 21, 2014, at least one potential reuse of the bridge in Keene, N. H. had been explored and found infeasible.

The present meeting (June 26, 2014) was a field inspection for the purpose of evaluating the structural condition of the bridge and any impediments to its careful disassembly for re-use elsewhere, or for storage until a re-use can be determined. According to Parsons-Brinckerhoff representatives Keith Donington and Adam Stockin, there was no observable reason why the bridge cannot be disassembled with care for moving or for storage and later reassembly. In response to a question from James Garvin, Donington and Stockin indicated that they had not been informed of any designation of a place of temporary storage for the bridge if a reuse for the structure has not been identified by the time the replacement overpass must be constructed on the Ash Street/Pillsbury Road alignment.

Consultant James Garvin pointed out that this bridge has apparently not been placed on the agenda of a regularly scheduled cultural resources meeting at the New Hampshire Department of Transportation since the meeting of July 12, 2007. He suggested that the project should be added to a future cultural resources agenda as soon as any outstanding issues or questions at Parsons-Brinckerhoff had been defined for discussion at such a meeting.

This memorandum is intended to inform interested parties of the current status of the evaluation of the bridge and to serve as a basis for discussion when the project is placed on the agenda of a future cultural resources meeting at the New Hampshire Department of Transportation.

Respectfully submitted,
James L. Garvin